

Reliability and Validity of an Electronic Inclinometer (EI) and Standard Goniometer (SG) for Measuring the Q-angle in 2 Different Positions in a Sample of Women.

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Background: The Q-angle is formed by the longitudinal axis of the femur and the line of pull of the patellar ligament. Possible larger Q-angles may be linked with patellofemoral pain. The reliability and concurrent validity of the EI and the SG has also not been investigated for measurement of the Q-angle.

Purposes: To determine the intra- and inter-tester reliability of Q-angle measurements in the supine and standing positions and concurrent validity between these tools.

Methods: Two testers (an experienced physical therapist (PT) and a novice PT student) measured participants' Q-angles (32 women; 19 to 35 years) using the EI and SG. Measurements with each tool were taken in the standing and supine positions by both testers. Whether the test position was in standing or supine, the participants were positioned with the heels placed 7.5 cm apart. The average of two trials in the standing and supine positions was used for data analysis. The data were analyzed using intraclass correlation coefficients (ICC), dependent t-tests, and Pearson's correlation coefficient (r).

Results: Intra-rater reliability for measuring Q-angle in the supine and standing positions using the SG was good with ICC values of .94 and .90. The EI intra-rater reliability was also good with ICC values of .94 and .79. Inter-rater reliability for measuring Q-angle in the supine and standing positions using the SG was moderate with ICC (2,2) values of .50 and .53, and for using the EI was poor with ICC (2,2) of .41 and .46. The Pearson r coefficient revealed a strong positive relationship between the SG and the EI with $r = .87$ in the standing position and $r = .68$ in the supine position. A dependent t-test found no significant difference between Q angle values when comparing positions using a SG, but did report a significant difference between positions when using the electronic inclinometer ($p < .001$).

Conclusions: The SG and EI were shown to be reliable with repeated measurements of the Q-angle by the same therapist but reliability dropped considerably when measurements were taken by different therapists. Measurements can be taken in the standing or supine positions with equal results when using the SG but the same is not true when using the EI. Measurements taken with the EI are strongly related to the SG. Although both instruments appear to be measuring the same thing, these devices should not be used interchangeably.